UT651.1003 Storage

Introduction

The planning and design of animal waste storage facilities requires a decision to be made regarding the number of days the facility will be designed for. That decision has a large impact, not only on how the storage facility functions, but also on the cost of the facility. Daily hauling and spreading eliminates almost all need for storage facilities, but increases the potential for non-point source pollution. Setting a "one size fits all" storage period does not account for operational and management considerations and can cause unjustified expenditures.

Flow Chart Method

Differing philosophies among technicians, engineers, soil conservationists, and agronomists has contributed to widely differing decisions regarding the number of days for which a storage facility is designed. A flow chart method has been adopted for use in Utah to obtain consistency in determining the number of days for which a storage facility is designed.

Making Adjustments to the Storage Period/Volume

Once the number of days of storage has been determined using the flow chart, appropriate adjustments in the storage period/volume can then be made. Adjustments can be considered when:

- manure will be applied on frozen and/or snow covered ground, as determined by the Utah Manure Application Risk Index (UMARI),
- manure staging areas are designed,
- composting facilities are designed.

No other adjustments can be made unless specifically granted by the State Conservationist.

When making the adjustment based on UMARI, the storage volume would be reduced based on the volume of manure that would be applied on land suitable for winter application. The allowable volume would be calculated based on the agronomic rate as determined by Nutrient Management Practice Standard 590 and the number of acres suitable for winter application. Crop rotational patterns must be accounted for when determining the number of acres available, meaning that the same number of acres suitable for winter application must be available every year. If not, then the lowest number of acres that would be available on any year should be used.

Where manure staging areas are designed, the number of days of storage would be reduced by the days of storage planned for the manure staging area(s). Practice standard 313A will be used when planning manure staging areas.

Where a composting facility is designed, the number of days of storage, as determined by the flow chart, can be reduced by the capacity of the composting facility. A minimum amount of

storage should be considered where manure cannot be transported to the composting site during wet or snowy conditions.

Design Storage Period Footnotes (Refer to Flow Chart)

1/ Where annual crops are grown, the storage period for solids would extend from fifteen days prior to the date the last spring crop is planted to the day that the first crop is generally harvested (Ex: 15 days prior to corn planting on May 1 through July 25 when winter wheat is generally harvested = 90 days storage time needed).

Where perennial crops are grown, the storage period for solids would extend from the green up of the grass, alfalfa, or other perennial crops to the average harvest date (Ex: Alfalfa grown for seed, April 1 to August 15 = 135 days).

2/ The summer storage period for solids would be based on grower objectives and management practices. Inventory should be gathered as to when the landowner is currently applying manure and under what conditions. Management practices should be analyzed to determine if they are adequate for pollution prevention. Considerations might include crop rotation, amount of land available for spreading, fallow ground available, double cropping, etc.)

3/ The storage period for solids would be based on the time the ground is generally frozen. This will be determined by using average air temperatures obtained from the Utah Climate Handbook. When average monthly mean temperatures are less than or equal to 32 degrees then 30 days of storage will be used. When the average monthly mean temperature is from 32 to 40 degrees, then 15 days of storage will be used. Total storage for all months will then be added.

	Average Monthly Temperatures					Storage
Location	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Days**
Beaver	37.5	29.6	27.5	32.3	37.7	105
Cedar City	39.7	30.7	29.5	34.6	40.1	90
Delta	37.6	26.4	24.3	32.2	40.2	90
Farmington	39.8	31.7	28.5	34.0	40.5	90
Hanna	32.1	22.5	21.4	26.0	32.5	150
Heber	34.9	24.0	21.2	26.3	34.8	120
Kanab	44.7	36.4	35.2	39.9	44.5	45
Logan 5 SW	36.9	25.7	23.6	28.5	37.0	120
Manti	37.3	27.2	25.4	30.7	37.9	120
Ogden Sugar	39.4	29.0	26.6	32.5	40.7	90
Panguitch	34.7	25.8	24.0	29.0	35.0	120
Randolph	27.9	13.4	12.9	18.5	29.7	150
Richfield Radio	37.9	28.5	27.0	33.0	39.6	105

4/ The storage period for evaporation ponds will be based on monthly mean air temperatures. The full number of days in the month would be used when the mean air

temperature is 40 degrees or lower. Evapotranspiration rates should be used rather than pan evaporation rates. Where pan evaporation rates are used, they will be reduced by 30 percent. Once the storage period has been determined and an initial storage volume calculated, additional volume must also be added for a 25 yr. 24 hour storm as well as corral runoff, annual precipitation, and solids accumulation. The final design volume must meet the criteria in the Waste Storage Structure Practice Standard 313.

5/ Suspended solids must be separated out as much as possible. If solids are not separated from liquids, evaporation rates will not be achieved. An accounting must be made in the Operation and Maintenance of the pond to empty it under emergency conditions. This might occur if the pond has not evaporated prior to the ground freezing in the fall.

6/ The same procedure as outlined in footnote number 3 above will be used to determine the storage period for liquid wastes that are applied through irrigation systems that can apply a net irrigation of 2 inches or less at 60% or greater efficiency. Where net irrigation exceeds 2 inches or efficiency is less than 60%, add 45 days to the storage period. The following table shows a limited number of areas throughout Utah and the storage days for each area:

	Storage Days where net application is:	
Location	**Less than or equal to 2”**	**Greater than 2”**
Beaver	105	150
Cedar City	90	135
Delta	90	135
Farmington	90	135
Hanna	150	195
Heber	120	165
Kanab	45	90
Logan 5 SW	120	165
Manti	120	165
Ogden Sugar	90	135
Panguitch	120	165
Randolph	150	195
Richfield Radio	105	150

7/ Liquids applied thru an irrigation system must be applied according to IWM principles (intake rate cannot be exceeded during application and liquids cannot be applied at rates greater than available water holding capacity). These liquids can be applied outside the growing season as long as ground is not frozen and IWM principles are followed. Tank applied liquids, however, can be applied on frozen/snow covered ground provided all criteria as stated in Nutrient Management Standard 590 are met. Management practices such as reducing the amount of water used in the system and recycling of water should be encouraged to limit the amount of water that needs to be stored. All liquids should be applied in such a way as to not cause leaf or crop burning. Irrigation systems should be flushed with clean water at the end of the irrigation cycle.